

Hurricane and Severe Storm Sentinel (HS3) Mission

HS3 2013.09.17-18 Flight Report: GLOBAL HAWK AV-1 mission to TS Humberto

Mission Scientists:

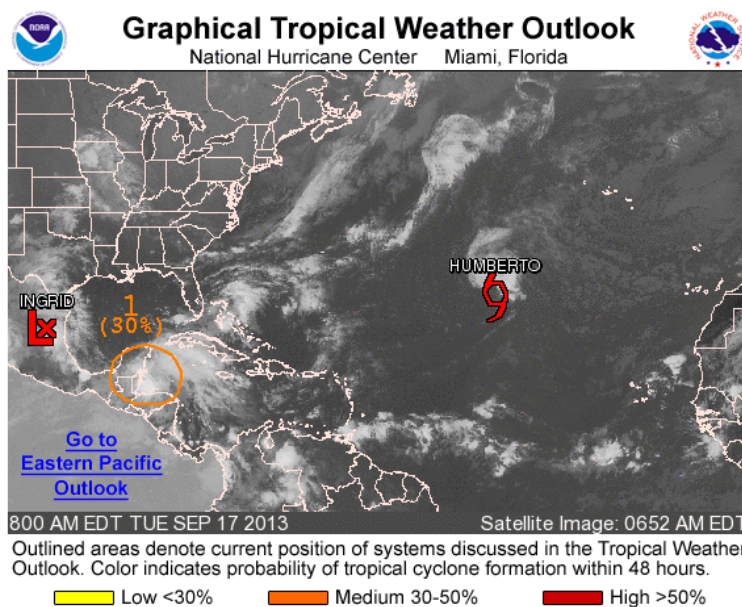
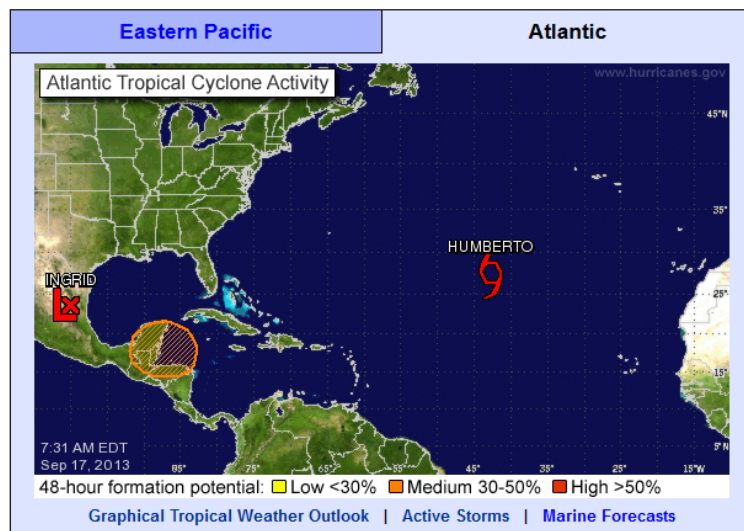
Shift 1 (0800-1700 UT): Scott Braun/Pete Black /Pete Colarco

Shift 2 (1600-0100 UT): Deanna Hencé/Bob Houze

Shift 3 (0000-0900 UT): Paul Newman/Mike Montgomery/Chris Thorncroft

Shift 4 (0800-1200 UT): Scott Braun/ Pete Black/Pete Colarco

Mission goal: The goal of this flight is to sample overstorm of reformed TS Humberto



The NHC discussion at 0800 UTC is shown below:

ZCZC MIATWOAT ALL
TTAA00 KNHC DDHHMM

TROPICAL WEATHER OUTLOOK
NWS NATIONAL HURRICANE CENTER MIAMI FL
800 AM EDT TUE SEP 17 2013

FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO...

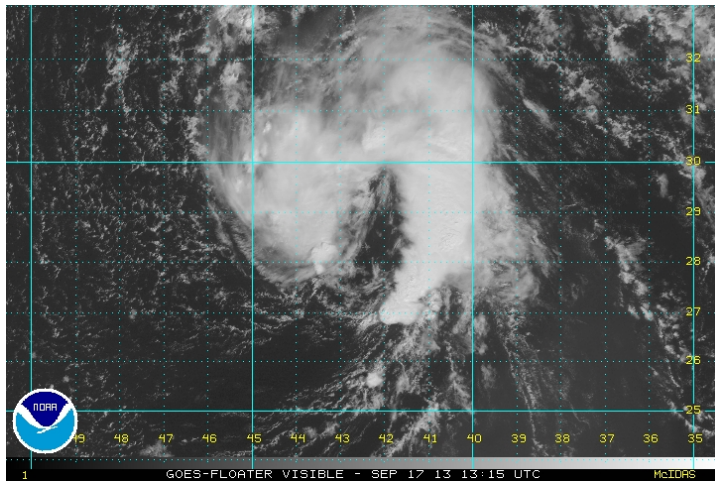
THE NATIONAL HURRICANE CENTER HAS ISSUED THE LAST ADVISORY ON
TROPICAL DEPRESSION INGRID...LOCATED INLAND OVER NORTHEASTERN
MEXICO...AND IS ISSUING ADVISORIES ON TROPICAL STORM HUMBERTO...
LOCATED OVER THE EASTERN ATLANTIC WELL SOUTHWEST OF THE AZORES.

1. A BROAD AREA OF LOW PRESSURE LOCATED OVER BELIZE AND THE SOUTHERN
YUCATAN PENINSULA IS ACCOMPANIED BY A LARGE AREA OF CLOUDINESS AND
THUNDERSTORMS. THE LOW IS FORECAST TO MOVE SLOWLY TOWARD THE
WEST-NORTHWEST AND EMERGE OVER THE BAY OF CAMPECHE TONIGHT OR
WEDNESDAY. ENVIRONMENTAL CONDITIONS ARE EXPECTED TO BE A LITTLE
MORE FAVORABLE FOR DEVELOPMENT DURING THE NEXT DAY OR TWO...AND
THE LOW HAS A MEDIUM CHANCE...30 PERCENT...OF BECOMING A TROPICAL
CYCLONE DURING THE NEXT 48 HOURS. THE LOW IS LIKELY TO DRIFT TOWARD
THE WEST-NORTHWEST OVER THE SOUTHWESTERN GULF OF MEXICO LATER IN
THE WEEK...AND ENVIRONMENTAL CONDITIONS SHOULD CONTINUE TO BE
GENERALLY CONDUCIVE FOR SOME ADDITIONAL DEVELOPMENT DURING THAT
TIME. THIS SYSTEM HAS A MEDIUM CHANCE...50 PERCENT...OF BECOMING A
TROPICAL CYCLONE DURING THE NEXT 5 DAYS.

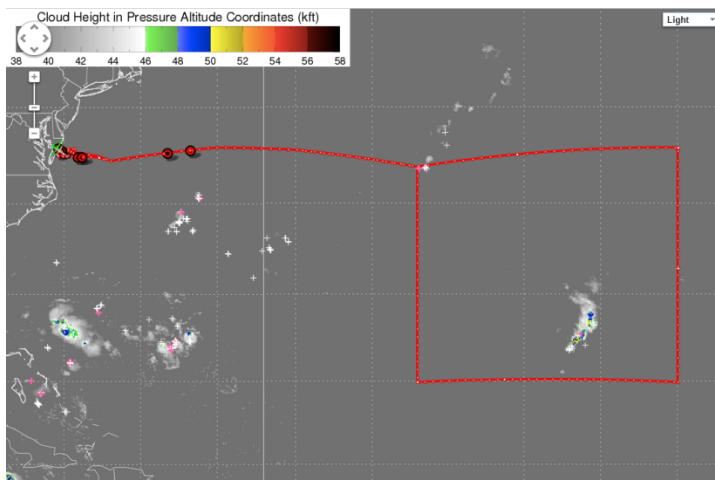
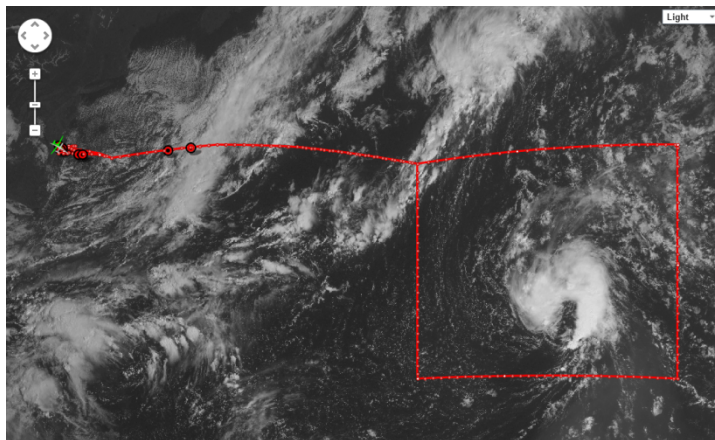
FIVE-DAY FORMATION PROBABILITIES ARE EXPERIMENTAL IN 2013. COMMENTS
ON THE EXPERIMENTAL FORECASTS CAN BE PROVIDED AT...

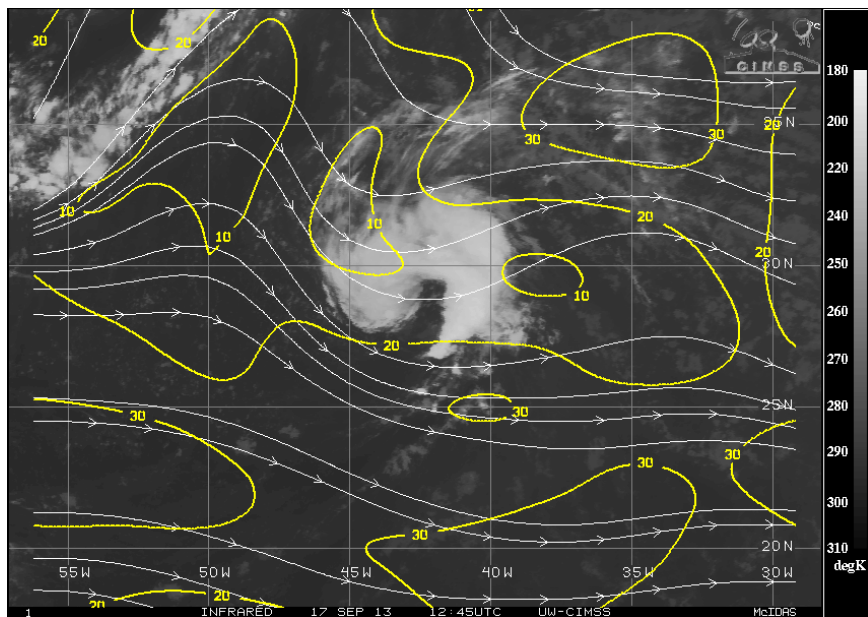
[HTTP://WWW.NWS.NOAA.GOV/SURVEY/NWS-SURVEY.PHP?CODE=ETWO](http://www.nws.noaa.gov/survey/nws-survey.php?code=etwo)

FORECASTER AVILA



1329 GOES 1315 visible image of storm

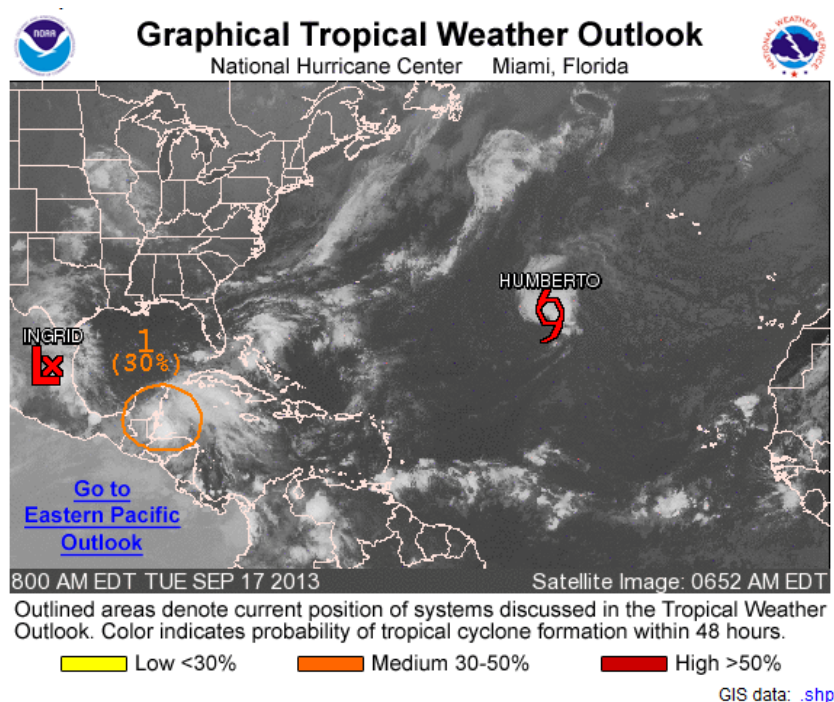




Cloud tops very low, only significant on SE quadrant of system. Far more favorable shear environment relative to yesterday's flight, clearly seen as system is redeveloping.

1357 Begin taxi

1400 Take off! This is the 100th flight of the two NASA Global Hawks (75 on AV-6 and 25th of AV-1).



1500 NHC updates center position of storm and speed. Now at 29.4 N, 42.5 W moving at 9 kts.

1544 Mission reports an INS problem they are discussing now. May result in abort/RTB. Sigh ☹

1554 Similar to problem from Tuesday Sept. 10 flight we have navigation problems that require return to base. Kearfott problems.

Nothing further to report.

1830 UTC Landing

Instrument reports

HAMS Report: Shannon Brown, Isaac Ramos, Jordan Tanabe, Todd Gaier, Bjorn Lambrigtsen

HAMS performed well during the short 9/17/2013 flight. The instrument landed with the radome intact. The networking at WFF worked as expected and the real-time ground data processing system worked for the flight duration.

The figure below shows the HAMS 50.3 GHz TB. HAMS observed some clouds and precipitation prior to returning to base.

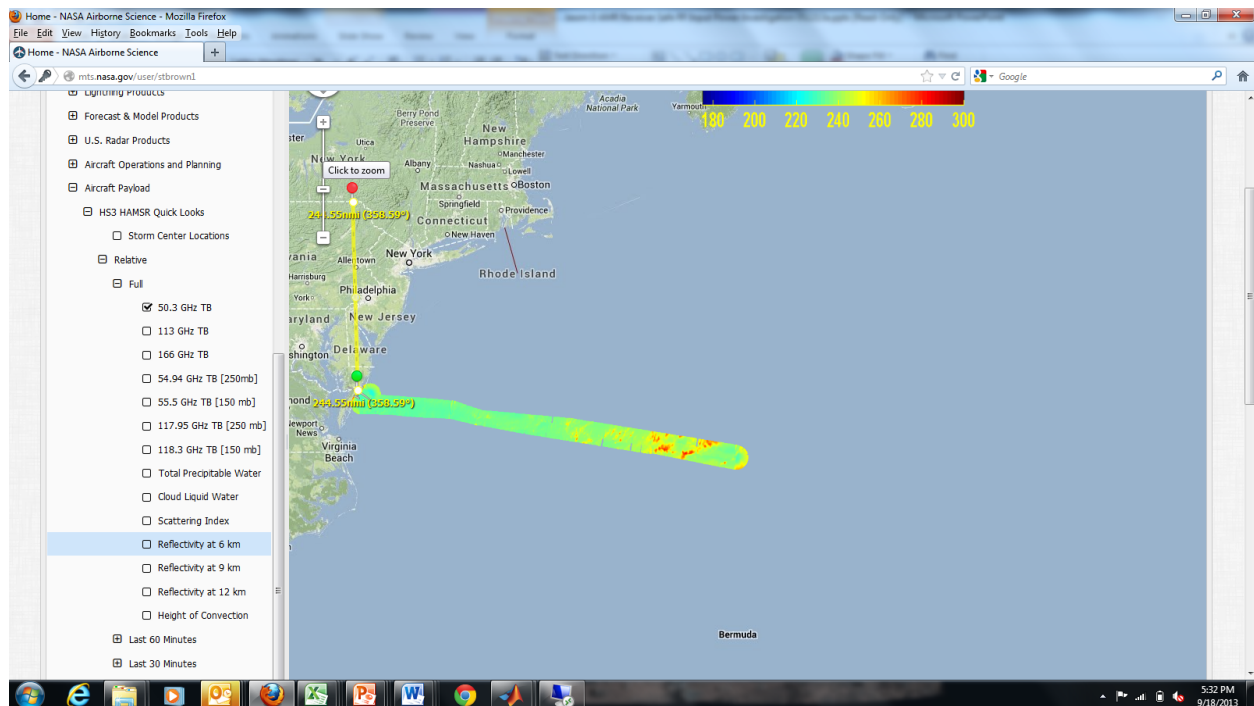
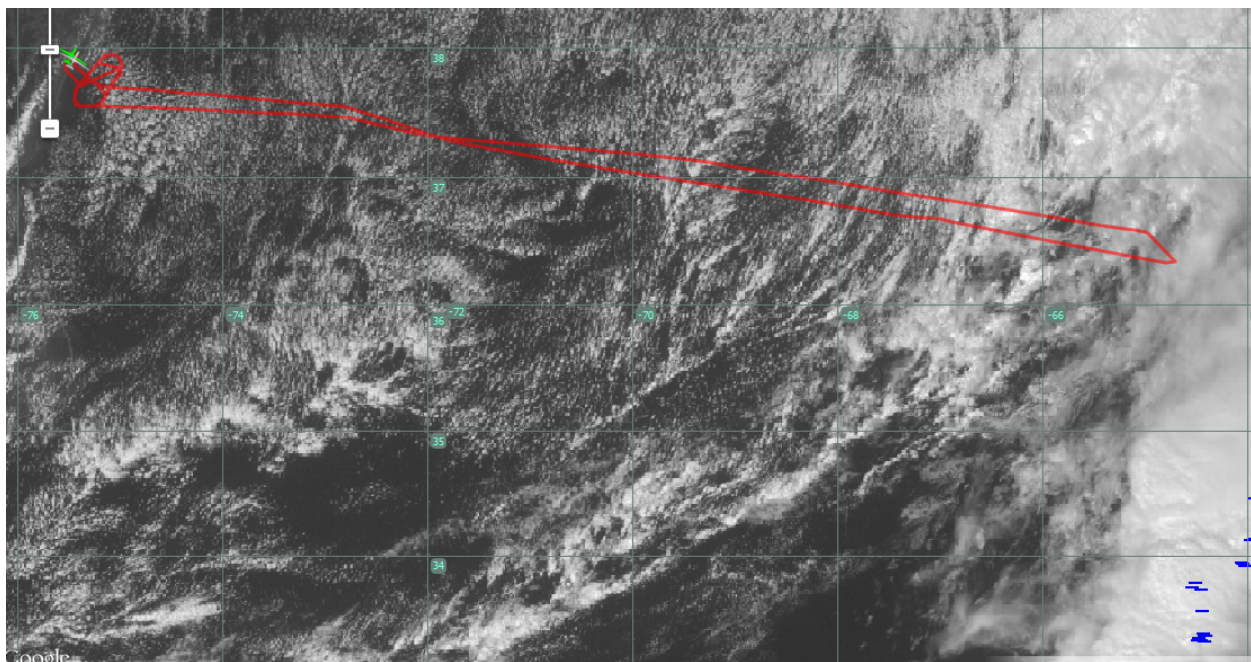


Figure 1. HAMS 50.3 GHz TB during the 9/17 flight.

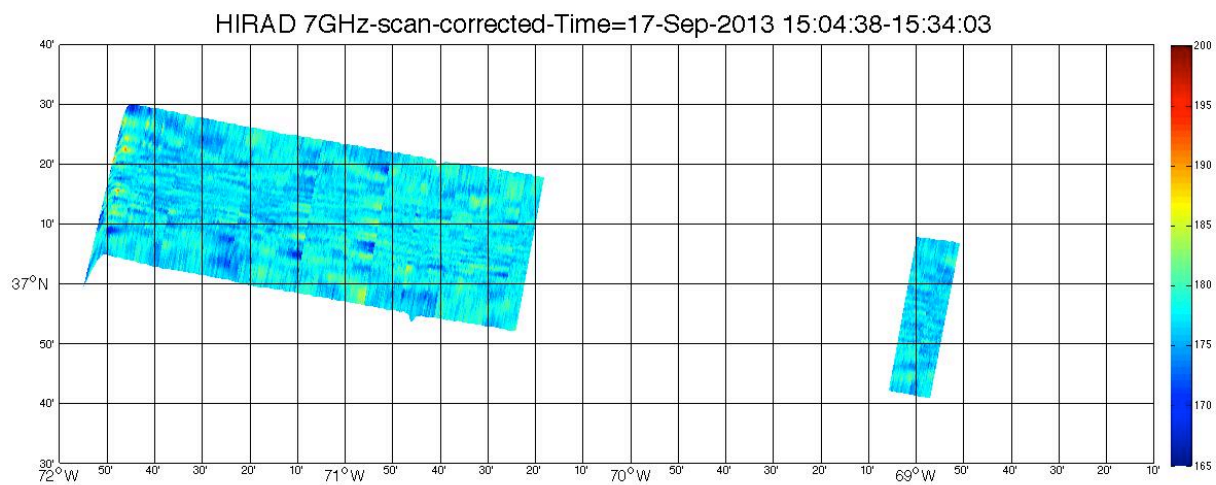
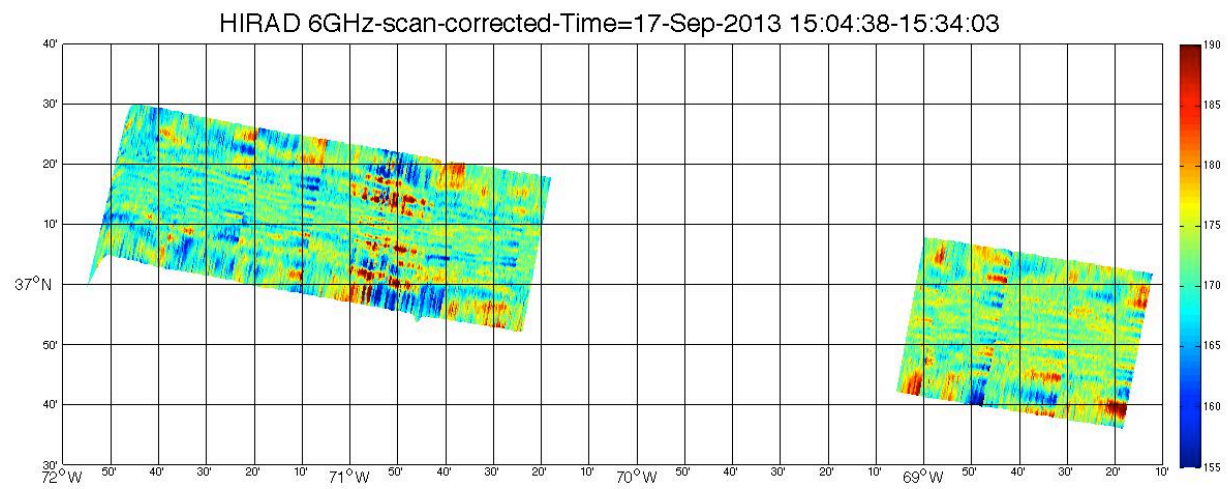
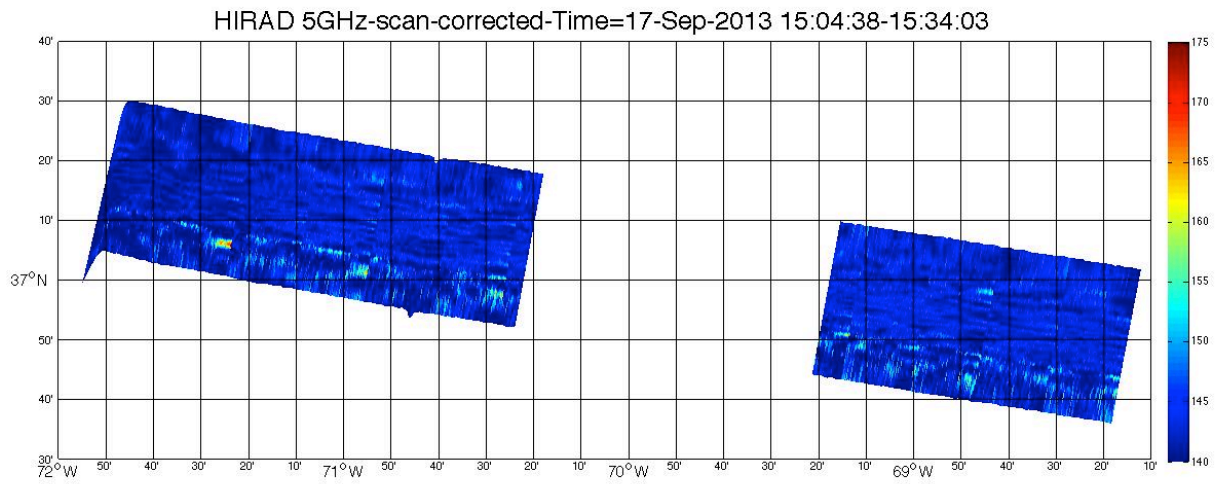
HIRAD

HIRAD performed nominally, during the short flight intended for Tropical Storm Humberto before a return-to-base was called (see screen shot below for flight tracks). The receiver heaters were turned-on and temperature stability was achieved. However, shortly thereafter AV1 navigation system lost one of the 4 redundant units, which violated the flight rules and AV1 returned to WFF before reaching the storm. So no meaningful science was achieved on this flight.

Regardless there was a long stretch of relatively clear sky (see visible GOES image background in figure) that can be used to assess the instrument calibration stability. Samples of the real-time data dumps are provided.



It is recommended that the following color table be used for the near-real time corrected data. By approx. matching the clear ocean color relative changes in the dc level are proportional to wind speed and rain events appear a progressive increases in Tb with frequency.



HIWRAP

HIWRAP operated perfectly through the 17 September 2013 flight. It collected reflectivity and Doppler data through a line of small storms, but was turned off during a portion of the flight to conserve hard drive space. Real-time data was improved, allowing for both good positioned data in the real time image and uncalibrated reflectivity over the full vertical profile below the aircraft. An example of the real-time reflectivity data taken at Ka-band is below (although still of reduced quality from the final science products).

During preflight a significant failure in a data line from the HIWRAP data system to the transceivers on the scanner was found that would prevent radar radiation during the 17 Sept. flight. The precise cause of this failure is not currently known, but we suspect it to be a failure of one line in the slip ring used to transfer signals and power to the radar scanner. This problem was fixed using a spare slip ring circuit, and the repair worked flawlessly through the science flight. We will wait until after active use in the HS3 campaign to fully investigate the failure.

Below is an image of the real-time data during this flight. The top subplot is a vertical curtain view of reflectivity below the aircraft. The bottom two subplots are horizontal reflectivity corresponding to the elevations indicated by the horizontal lines on the top subplot. This real-time data snapshot is not representative of the final quality of science data.

